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SHOWING ANCESTORS IN TREE VIEW WHILE SCROLLING

BACKGROUND OF THE INVENTION

5   **1.   Technical Field:**

The present invention relates generally to an improved graphical user interface for a computer system. In particular, the present invention relates to a method, apparatus, and computer instructions for indicating, in a

10   graphical user interface, the directory location of the currently visible elements while scrolling through a tree structure.

2.   Description of Related Art:

15   Directory tree controls are ubiquitous in computer programs today. Information stored in large data resources is structured to allow a user to easily view and access the information. The typical data structure used in these large data resources is a directory tree

20   structure.

In a tree structure, data files are organized in a hierarchical format and displayed for viewing. Microsoft DOS, Windows, and the Macintosh OS are examples of operating systems whose file systems group files into

25   directories. Directories are often referred to as folders. Directories may contain files or other directories. Within the tree structure, a user can select and manipulate files represented by members within the tree utilizing a mouse, keyboard or other input

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device.   User selection via a mouse can be accomplished by "pointing and clicking" on a selectable feature on the computer display.

5   While the tree structure is useful and is quite prevalent within the operating systems and applications of most present day computers, as the number of files and directories within a computer that a user must manage is growing at a significant rate, it can become unwieldy for a user to understand the tree structure using currently

10   known methods.   The large memory capacity now available in modern personal computers has been utilized by application writers to create software with an increasing number of components. Further, the linking of external memory through interconnected computers has further

15   increased the proliferation of the number of files, software tools and other system objects which are accessible to and often displayed in a tree format to a user.

Figure 1 is a pictorial representation of a

20   graphical user interface for a computer system showing a known tree structure. Window **100** in **Figure 1** illustrates a data resource that contains many branches and many levels to each branch. Four vertical dotted lines **102**, **104**, **106**, **108**, in left pane **110** of window **100** indicate

25   that there are four ancestors for the folders currently in view. When a user is scrolling through the tree structure, window **100** does not provide any details as to where the user is in the directory structure. This situation is not a problem if a user selects a particular

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item or folder in the display, for once the item is
selected, the selected item and its ancestors are shown
in Address bar **112** (if present). However, if the user is
scrolling through the large directory structure in search
5   of a particular folder, a user may not know where in the
data hierarchy the folders currently in view are located.
Searching for a particular folder by selecting each
folder in the display (e.g., pressing the down arrow
button on the keyboard to select each folder, etc.) is
10   cumbersome since the user may scroll only one item at a
time. In addition, there may be a delay when selecting
each item as the contents of each selection is displayed
in right pane **114**. Thus, as data tree controls are used
to represent increasing larger sets of resources, a user
15   may find that he or she cannot view the parent or
grandparent node of the nodes currently in view.

        Therefore, it would be advantageous to have an
improved method, apparatus, and computer instructions for
indicating the current ancestor hierarchy in a graphical
20   user interface while scrolling through the tree
structure.

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SUMMARY OF THE INVENTION

The present invention provides a method, apparatus,
and computer instructions for indicating the current
5   ancestor hierarchy in a graphical user interface while
scrolling through the tree structure. A determination is
made as to the current ancestor hierarchy based on an
item displayed in a designated section of the tree
structure. The designated section of the tree structure
10 may be the topmost, bottommost, or any other file or
directory displayed in the pane. When user searches for
files or folders by scrolling through data displayed in a
tree structure, a new item may be shown in the designated
section of the tree structure. As a result, the ancestor
15 hierarchy display is updated with the current ancestor
hierarchy for the item in the designated section of the
tree structure.

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BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

Figure 1 is a pictorial representation of a graphical user interface for a computer system showing a known tree interface;

Figure 2 is a pictorial representation of a data processing system in which the present invention may be implemented in accordance with a preferred embodiment of the present invention;

Figure 3 is a block diagram illustrating a data processing system in which the present invention may be implemented;

Figure 4A is an example of providing a text display of the full path of the current ancestor hierarchy by adding dedicated areas of the graphical user interface;

Figure 4B is an example of an alternative embodiment for providing a text display of the full path of the current ancestor hierarchy by replacing existing areas of the graphical user interface;

Figure 4C is an example of another alternative embodiment for providing a graphical display of the full

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path of the current ancestor hierarchy in a manner

consistent with a tree structure display; and

     Figure 5 is a flowchart of a process for indicating

the current ancestor hierarchy while scrolling through a

5   tree structure in accordance with a preferred embodiment

of the present invention.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the figures and in particular
with reference to **Figure 2**, a pictorial representation of
5   a data processing system in which the present invention
may be implemented is depicted in accordance with a
preferred embodiment of the present invention. A
computer **200** is depicted which includes system unit **202**,
video display terminal **204**, keyboard **206**, storage devices
10   **208**, which may include floppy drives and other types of
permanent and removable storage media, and mouse **210**.
Additional input devices may be included with personal
computer **200**, such as, for example, a joystick, touchpad,
touch screen, trackball, microphone, and the like.
15   Computer **200** can be implemented using any suitable
computer, such as an IBM eServer computer or
IntelliStation computer, which are products of
International Business Machines Corporation, located in
Armonk, New York. Although the depicted representation
20   shows a computer, other embodiments of the present
invention may be implemented in other types of data
processing systems, such as a network computer. Computer
200 also preferably includes a graphical user interface
(GUI) that may be implemented by means of systems
25   software residing in computer readable media in operation
within computer **200**.

With reference now to **Figure 3**, a block diagram of a
data processing system is shown in which the present
invention may be implemented. Data processing system **300**

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is an example of a computer, such as computer **200** in

Figure 2, in which code or instructions implementing the

processes of the present invention may be located. Data

processing system **300** employs a peripheral component

5   interconnect (PCI) local bus architecture. Although the

depicted example employs a PCI bus, other bus

architectures such as Accelerated Graphics Port (AGP) and

Industry Standard Architecture (ISA) may be used.

Processor **302** and main memory **304** are connected to PCI

10   local bus **306** through PCI bridge **308**. PCI bridge **308** also

may include an integrated memory controller and cache

memory for processor **302**. Additional connections to PCI

local bus **306** may be made through direct component

interconnection or through add-in boards. In the depicted

15   example, local area network (LAN) adapter **310**, small

computer system interface SCSI host bus adapter **312**, and

expansion bus interface **314** are connected to PCI local bus

306 by direct component connection. In contrast, audio

adapter **316**, graphics adapter **318**, and audio/video adapter

20   **319** are connected to PCI local bus **306** by add-in boards

inserted into expansion slots. Expansion bus interface

314 provides a connection for a keyboard and mouse adapter

320, modem **322**, and additional memory **324**. SCSI host bus

adapter **312** provides a connection for hard disk drive **326**,

25   tape drive **328**, and CD-ROM drive **330**. Typical PCI local

bus implementations will support three or four PCI

expansion slots or add-in connectors.

An operating system runs on processor **302** and is used

to coordinate and provide control of various components

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within data processing system **300** in **Figure 3**.   The
operating system may be a commercially available operating
system such as Windows XP, which is available from
Microsoft Corporation.   An object oriented programming
5   system such as Java may run in conjunction with the
operating system and provides calls to the operating
system from Java programs or applications executing on
data processing system **300**.   "Java" is a trademark of Sun
Microsystems, Inc.   Instructions for the operating system,
10   the object-oriented programming system, and applications
or programs are located on storage devices, such as hard
disk drive **326**, and may be loaded into main memory **304** for
execution by processor **302.**

   Those of ordinary skill in the art will appreciate
15   that the hardware in **Figure 3** may vary depending on the
implementation.   Other internal hardware or peripheral
devices, such as flash read-only memory (ROM), equivalent
nonvolatile memory, or optical disk drives and the like,
may be used in addition to or in place of the hardware
20   depicted in **Figure 3**.   Also, the processes of the present
invention may be applied to a multiprocessor data
processing system.

   For example, data processing system **300**, if
optionally configured as a network computer, may not
25   include SCSI host bus adapter **312**, hard disk drive **326**,
tape drive **328**, and CD-ROM **330**. In that case, the
computer, to be properly called a client computer,
includes some type of network communication interface,
such as LAN adapter **310**, modem **322**, or the like.   As

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another example, data processing system **300** may be a
stand-alone system configured to be bootable without
relying on some type of network communication interface,
whether or not data processing system **300** comprises some
5   type of network communication interface. As a further
example, data processing system **300** may be a personal
digital assistant (PDA), which is configured with ROM
and/or flash ROM to provide non-volatile memory for
storing operating system files and/or user-generated
10   data.

     The depicted example in **Figure 3** and above-described
examples are not meant to imply architectural
limitations. For example, data processing system **300** also
may be a notebook computer or hand held computer in
15   addition to taking the form of a PDA. Data processing
system **300** also may be a kiosk or a Web appliance.

     The processes of the present invention are performed
by processor **302** using computer implemented instructions,
which may be located in a memory such as, for example,
20   main memory **304**, memory **324**, or in one or more peripheral
devices **326-330**.

     The present invention provides a method, apparatus,
and computer instructions for showing the current
ancestor hierarchy in a tree structure while scrolling
25   through the tree structure. In current tree structures
representing large sets of resources, it may be difficult
for a user to navigate and maneuver through the tree
structure. The present invention overcomes problems
associated with navigating through the director tree by

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indicating the current ancestor hierarchy as the user
scrolls through the tree structure.

When a user scrolls through a large data structure
searching for a particular folder, a user may lose track
5   of where in the tree structure the items currently in
view are located. The present invention proposes showing
the current ancestor hierarchy based on an item displayed
in a designated section of the tree structure. The
designated section of the tree structure may be the
10   topmost, bottommost, or any other file or directory
displayed in the pane. As the user scrolls through the
tree structure, if a new item is shown in the designated
section of the tree structure, the current ancestor
hierarchy display is updated. The current ancestor
15   hierarchy for the new item is then displayed in the tree
structure.

Figures **4A-4C** illustrate examples of different
options for indicating the current ancestor hierarchy
while scrolling through a tree structure. Although
20   Figures **4A-4C** are shown in a Microsoft Windows
environment, the present invention may be used in any
software program to organize data using any tree
metaphor.

Figure 4A depicts an example of providing a text
25   display of the full path of the current ancestor
hierarchy by adding dedicated areas of the graphical user
interface. Window **400** in **Figure 4A** illustrates a data
resource that contains many branches and many levels to
each branch in tree structure **402**. Tree structure **402**

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may be executed on a data processing system, such as data
processing system **300** in **Figure 3**. Four vertical dotted
lines **404**, **406**, **408**, **410** in left pane **412** of window **400**
indicate that there are four ancestors for the folders

5   currently in view, although the user does not know what
they are. It should be noted that Address Bar **422** is not
showing the current location because the selected item,
which is no longer in view, has not changed. Text
display **414** of the ancestor hierarchy is shown at the top

10   of window **400** in Figure **4A**. However, text display **414**
may be shown in any location in window **400**.

The full path of the current ancestor hierarchy is
displayed in an existing area of window **400** by adding a
dedicated area of the graphical user interface to display

15   the current ancestor hierarchy, such as dedicated area
416. In this embodiment, text display **414** is displayed
only while the user is scrolling tree structure **402**, and
is hidden from view a specified amount of time after
scrolling has ended. A user may scroll through tree

20   structure **402** by clicking and dragging slider **418** in
scroll bar **420**. If the user scrolls by selecting the
up/down buttons or the page up/page down buttons on the
keyboard, or by clicking the up/down arrows on scroll bar
420, the full path of the current ancestor hierarchy may

25   temporarily be displayed for a specified period of time.

Figure 4B depicts an alternative embodiment for
providing a text display of the full path of the current
ancestor hierarchy by replacing existing areas of the
graphical user interface. Window **430** contains tree

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structure **432**, which may be executed on a data processing system, such as data processing system **300** in **Figure 3**. Text displays **434**, **436** of the ancestor hierarchy are shown at the top and bottom of window **430** in Figure **4B**.
5   However, text displays **434**, **436** may be shown in any location in window **430**.

As the full path of the current ancestor hierarchy is displayed in an existing area of window **430**, text display **434**, **436** replaces a section of left pane **432**. In
10   this alternative embodiment, text displays **434**, **436** are displayed only while the user is scrolling tree structure **432**, and are hidden from view a specified amount of time after scrolling has ended.

Figure 4C depicts another alternative embodiment for
15   providing a graphical display of the full path of the current ancestor hierarchy by in a manner consistent with a tree structure display. Window **450** contains tree structure **452**, which may be executed on a data processing system, such as data processing system **300** in **Figure 3**.

20   Graphical display **454** of the ancestor hierarchy is shown at the top of window **450** in Figure **4C**. However, graphical display **454** may be shown in any location in window **450**. The full path of the current ancestor hierarchy is displayed in a manner consistent with the
25   graphical display of window **450**. Although graphical display **454** requires more space than the embodiments illustrated in Figures **4A** and **4B**, graphical display **454** in Figure **4C** may allow a user to more quickly read and locate the immediate parent or grandparent of the item in

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a designated area of window **450**. For example, as shown
in Figure **4C**, the folders labeled "eclipse" and "plugins"
is easily readable as the respective grandparent and
parent for the item "com.ibm.debug.pdt.w". In addition,

5   graphical display **454** is presented in a similar graphical
format as the model used to display the directories in
window **450**.

   In the preferred embodiment, graphical display **454**
is displayed only while the user is scrolling tree

10   structure **452**, since this display requires more space in
window **450**. Furthermore, due to the additional space
requirement, rather than displaying graphical display **454**
at both the top and bottom of window **450**, it would be
advantageous to only display graphical display **454** at the

15   top of window **450** when the user scrolls up tree structure
452, and only display graphical display **454** at the bottom
of window **450** when the user scrolls down tree structure
452, as users are likely to look towards the top of the
directory list in left pane **456** as they scroll up, and

20   look towards the bottom as they scroll down.

   When a user scrolls through a tree structure, at
some point, the items shown in the window may not all be
located in the same parent folder. In this situation,
multiple text or graphical displays may be used in the

25   window to indicate the ancestor hierarchies for the items
shown. For example, since users are likely to look
towards the top of the directory list as they scroll up,
the top area of the window may display a text or
graphical display of the current ancestor hierarchy for

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the topmost item in the window.   Likewise, since users
are likely to look towards the bottom of the directory
list as they scroll down, the bottom area of the window
may display a text or graphical display of the current
5   ancestor hierarchy for the bottommost item in the window.
In this manner, a user may obtain the current ancestor
hierarchies for multiple items shown in the window.

Turning next to **Figure 5**, a flowchart of a process
for indicating the current ancestor hierarchy in a tree
10   structure while scrolling through the tree structure is
depicted in accordance with a preferred embodiment of the
present invention.   The process illustrated in **Figure 5**
may be implemented in a computer, such as computer **200** in
Figure 2.

15   The process begins by displaying data using a tree
structure (step **502**).   Next, the user scrolls through the
data in the tree structure (step **504**).   A user may scroll
through the tree structure by clicking and dragging the
slider in the scroll bar, selecting the up/down buttons
20   on the keyboard, selecting the page up/page down buttons
on the keyboard, and the like.   A determination is then
made as to the current ancestor hierarchy based on an
item displayed in a designated section of the tree
structure (step **506**).   A designated section of the tree
25   structure may contain only one item.   A designated
section of the tree structure may be the topmost,
bottommost, or any other file or directory displayed in
the pane.   As the user scrolls through the tree
structure, if a new item is displayed in a designated

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section of the tree structure (step **508**), the ancestor
hierarchy display is updated with the current ancestor
hierarchy for the item in a designated section of the
tree structure (step **510**). The current ancestor

5 hierarchy for the new item is then displayed in the tree
structure (step **512**), with the process terminating
thereafter. Turning back to step **508**, if a new item is
not displayed in a designated section of the tree
structure, the current ancestor hierarchy display remains

10 unchanged (step **514**), with the process terminating
thereafter.

Thus, the present invention provides an improved
method, apparatus, and computer instructions for
indicating the current ancestor hierarchy while scrolling

15 through a tree structure. In these examples, a user may
view the current ancestor hierarchy for an item
positioned in a designated area of a graphical user
interface. As the user scrolls through the tree
structure in the graphical user interface, if a new item

20 is positioned in the designated area of a graphical user
interface, the ancestor hierarchy display is updated to
reflect the ancestor hierarchy of the new item. In this
manner, an advantage is provided over existing tree
structure interfaces by allowing a user to view the

25 current ancestor hierarchy while scrolling the tree
structure.

It is important to note that while the present
invention has been described in the context of a fully
functioning data processing system, those of ordinary

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skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention

5 applies equally regardless of the particular type of signal bearing media actually used to carry out the distribution. Examples of computer readable media include recordable-type media, such as a floppy disk, a hard disk drive, a RAM, CD-ROMs, DVD-ROMs, and

10 transmission-type media, such as digital and analog communications links, wired or wireless communications links using transmission forms, such as, for example, radio frequency and light wave transmissions. The computer readable media may take the form of coded

15 formats that are decoded for actual use in a particular data processing system.

The description of the present invention has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the

20 invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art. The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of

25 ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated.